Production:

The last of the hand thinning is on-going. There is some secondary re-growth from terminal buds and much more East of Toronto from the large amount of rain. The first pick of Sunrise has started in the far Southwest. Generally speaking, fruit is sizing well.

The province has been experiencing quite a contrast in rainfall this past month. While East of Toronto has been getting loads of rain, the Southwest is getting quite dry. Looking at the Agroclimate maps from Agriculture and Agri-Food Canada for the past 30 days, Durham and Northumberland Regions and Grey and Prince Edward County are at 115-150% of the normal precipitation, and Lennox & Addington, Frontenac and Leeds & Grenville have been receiving greater than 200% of the normal! All of these listed regions have had record high precipitation over the growing season, since the beginning of April.

Parts of Norfolk, Oxford, Brant, Chatham-Kent and all of Essex and Elgin have received 40-60% of the normal precipitation for the last 30 days with some drier spots where there was less than 40% of the normal precipitation. Growers who have irrigation, have their systems running in the dry regions of the province.

There are new label changes to Retain, which is used as a harvest management tool and reduces incidence of stem cracking as well as greasiness. For a single pick harvest, apply one pouch of ReTain per acre three to four weeks before anticipated harvest. This will delay the harvest up to 7 to 10 days. For a multi-pick harvest, apply one to two weeks before the beginning of the anticipated harvest. This should not delay the harvest of the first pick but will delay maturation of the later picks as well as improve the fruit quality.

International Fruit Tree Association Study Tour - Part 2:

Grand Rapids area of Michigan

Weather protection was discussed a lot on the International Fruit Tree Association (IFTA) tour with hail and frost protection being the hot topics.

- This spring was a bad year for frost and one orchard that we saw had temperatures down to -3/-4°. Micro-sprinklers were at a number of orchards where growers found it was more effective for protection this year because there was a breeze and not a strong inversion layer. Many orchards had wind machines and one orchard tried a Frostbuster (a pull behind orchard heater).

- For hail protection, a hail cannon was demonstrated. Hail cannons can cover up to 200 acres with the hope that it will disrupt hail formation.
With every IFTA summer tour and conference, new technology is demonstrated at various stops:

- There was a roller from Phil Brown Welding that rolled out reflective material that would go directly under the tree to improve colouring on varieties like Honeycrisp (Figure 1).

![Figure 1: A roller used to dispense reflective material underneath the canopy to improve fruit colouring.](image)

- There were three picking platforms on display:
  
  o One was from Orsi where pickers would pick into a basket and then transfer those apples into a bin on the platform. It can also be used for many other orchard tasks.

  o There was a platform called Piuma 4WD from REVO that had conveyer belt arms that would move the apples from the picker to the bin (Figure 2).

  o The platform from Phil Brown had an additional tow-behind vacuum harvest machine. The shoulder picking baskets had a vacuum tube at the bottom of each basket (Figure 3) which would deliver the apples to the bin.

- There was a remote controlled single bin buggy called a “Bin Dog” that can travel along with the picking crew.

- A bird deterrent “humming line” was on display which is a string about a foot above the canopy. It will vibrate with the breeze and produce a hum that is only detectable to birds. This will deter birds 15-18 feet away from the line, so this line can be placed in every other row.
Research projects were presented at the Michigan State University Clarksville research station and campus. Phil Schwallier, who is from the Michigan State University Extension team, also has an orchard where many trials were conducted.

- Fire blight management was a focus in a couple trials:
  - Apogee and Actigard were compared in terms of rates, number of applications, and applied together or alone. No fruit or leaf phytotoxicity was observed. There was no incidence of fire blight in all treatments including the untreated control. Shoot length was shortest with Apogee, regardless of Actigard in Gala.
  - George Sundin had a trial with several different treatment combinations of Streptomycin, Apogee, Kasumin, Oxytetracycline and experimental products. He really emphasized the use of Apogee.

- Insect exclusion netting was trialed at Phil Schwallier’s orchard where he looked at whether setting up the netting at different times of bloom would negatively affect pollination (Figure 4). There was no difference in pollination this year with the different timings. One
observation from that trial was that there were a lot of woolly apple aphids underneath the netting.

- There was a gibberellin frost trial on Gala where they compared all of the gibberellins on the U.S. market (Provide, Promalin, ProGibb, Falgrow, Perlan, NovaGibb). All of these products increased fruit set. There were much more severely frosted fruit (frost mummies) with GA$_{4+7}$ (i.e. Promalin and Perlan) than GA$_3$ (i.e. ProGibb) and the untreated control had the least mummies.

- ACC and metamitron were trialled on Gala for chemical thinning. These products are not yet registered in North America.
  - Metamitron thins best at 8-11 mm and efficacy is dose dependent
  - ACC was applied alone and in combination with 6-BA or NAA. ACC works best at thinning larger fruitlet size (20 mm). There was an additive effect on thinning when ACC was applied after NAA. There was also additional thinning when ACC was applied after 6-BA but it wasn’t significant. ACC caused leaf injury and it was greatest when applied after NAA and reduced when applied after 6-BA.

- Solid-Set Canopy Delivery System (SSCDS) was demonstrated at the Clarksville agriculture research station. This system can deliver product application through tubing in each row, with microsprayers placed within the rows, connected to a pumping and mixing station. This system can deliver pesticides and foliar nutrients. It can also be used for evaporative cooling to delay bloom and prevent heat stress. They have found that there is no difference with this system compared to using an airblast sprayer. There is also 10% less drift with the SSCDS compared to an airblast sprayer (Figure 5).

Crop management was thoroughly discussed at each spot. Here are some techniques that some growers are using to manage vigour, crop load and return bloom:

- One grower talked about his root-pruning methods to control vigour. He does this on 10th leaf Honeycrisp scions that were grafted onto existing 25 year old Red Delicious stumps on a M106 rootstock. These trees were quite vigorous and would have a lot of wood with no fruit. He also root prunes high density 5th leaf McIntosh and 10th leaf Galas. They use a pull behind knife-like implement that slices through the soil and roots. This goes 10-12” deep and will prune 2 ft from the trunk. They will root prune alternating years in the late spring or summer.
- The fruitlet growth model was discussed at one orchard. This grower only used 5 clusters on 3 trees, but found this wasn’t accurate enough and will mark and measure 15 clusters on 3 trees per block next year. What is recommended in the original model developed by Duane Green is to mark 15 clusters on 5 trees per block. This grower specifically uses this model on Gala, Honeycrisp, SweeTango, Fuji and McIntosh. Because of poor pollination during bloom and temperatures dropping to -4°C during bloom, the model didn’t work as well and results were inconsistent.

- Hand blossom thinning was done at one orchard to maintain biennial bearing in Honeycrisp. This technique was adopted from Washington State. The theory behind this technique is that the sooner the blossoms are off, the less effect there is on floral induction for next year’s buds.

**Diseases:**

Overall, pest activity has been relatively low since the last update.

**Fire blight** strikes can be found here and there in some orchards, including hail damaged blocks where streptomycin was not used following the trauma event.

New **apple scab** lesions continue to develop on leaves and fruit in orchards that saw escapes during the primary infection period (Figure 6). Interestingly, Kari Peter from Pennsylvania State University reported the last ascospore release from overwintering leaves was July 10, 2017. With first detection observed early March, that’s a 4-month primary infection period! Risk of secondary infection will continue until harvest. Growers should begin considering a pinpoint scab application. Be aware of preharvest restrictions with early varieties.

![Figure 6. Apple scab lesions on leaf (left) and fruit (right).](image)
The hot, humid weather with sporadic thunderstorms that many areas of the province experienced in recent weeks made for ideal conditions for fruit rot. Both black rot and bitter rot can be spread by rain-splash. Symptoms of fruit rot are now starting to develop and will likely continue as the fruit matures. Fruit mummies are known to harbor these pathogens (Figure 7). If possible, remove these while hand thinning or pruning to reduce the inoculum in the orchard.

**Blisterspot** was observed on Mutsu this week (Figure 8). Humid or wet conditions during the spring and early summer favour a build-up of bacterial populations. A brief shower is all that is required to distribute the bacteria onto the developing fruit where they infect through the lenticels. Mutsu are most susceptible beginning two weeks after petal fall lasting for about six weeks (late July). After this point, the lenticels on fruit are no longer susceptible to infection by the bacterium.

**Insects:**

**Apple maggot** catch continues. Numbers have been relatively low considering the wet soils and seemingly ideal conditions for emergence. That's not to mean we are out of the woods. Maggot activity will continue until the first hard frost so there is a chance populations may still build. Egg-laying has begun and some fruit damage has been reported.

Second generation adult **codling moth** catch continues in some areas. This re-enforces the importance of continuing to monitor using pheromone traps. While the spray timing has passed in many regions according to the degree day model, the extended adult activity could mean a long period of egg hatch.

Damage from first generation larvae has been found (Figure 9). Exit holes in fruit are typically much larger with frass protruding from the area and easier to spot than smaller entry holes. The second
generation larval activity will continue until harvest after which they will overwinter as late instar larvae or pre-pupae in bark crevices, in the soil or in nearby woodlots, wood piles or apple bins.

Based on degree days, second generation San Jose scale crawlers are expected to begin in most regions over the next couple of weeks. In general, pressure has been relatively low though some orchards do have extensive damage and will be applying a targeted insecticide. At this point in the season, control products will just be protecting the fruit. It is the dormant oil and early season insecticides that have an impact on knocking down the resident population. For resistance management, rotate to a different chemical group than what was applied for the first generation crawlers.

**Woolly apple aphid** colonies continue to move through the canopy (Figure 10). Some growers are beginning to hear complaints from workers about the stickiness these pests can cause. Unfortunately, with the loss of diazinon, there are few products that provide quick and effective knock-down. Refer to Table 3-10. *Activity of Insecticides and Miticides on Apple Pests* in the 2016-2017 Publication 360, *Guide to Fruit Production*. Summer pruning to open the canopy and increase air circulation will help manage woolly apple aphid populations, which tend to prefer the shelter of lush, dense foliage.

![Figure 9 (left). Fruit damage caused by codling moth.](image)

![Figure 10 (right). Woolly apple aphid on new terminal growth.](image)

With the new terminal growth, **leafcurling midge** can still be found. Orange-red eggs can be readily found in the newest leaves (Figure 11) where midge pressure has been high in previous years. With warm weather, signs of leafcurling can begin about a week after eggs are laid.

Evidence of other pest activity is still around including **Japanese beetle** (Figure 12) and **potato leafhopper** (Figure 13). These pests are particularly concerning on young trees. However, typical sprays applied at this time of the year for codling moth and/or apple maggot will have efficacy on Japanese beetle and leafhoppers as well.
It is time to start thinking about brown marmorated stink bug activity in the orchard. At this point in the year, adults and nymphs can migrate into the orchard, causing damage to mature fruit in the final weeks leading up to harvest. Commercial traps are available to monitor activity, if damage has been suspected in previous years. Continuing to scout into the fall (Sept/Oct) for signs of feeding damage is also important. Keep in mind, however, it can take a few weeks for symptoms to become obvious, particularly on red-skinned fruit. For more information, go to ontario.ca/stinkbug for Ontario updates or stopbmsb.org for pictures and control strategies.
European red mite, two-spotted spider mite and apple rust mite are increasing in some orchards. Those growers that are seeing populations reach threshold are opting for miticides with relatively quick knock-down. For more information, see Table 3-9. Activity of Miticides Registered on Apple and/or Pear in Ontario in the 2016-2017 Publication 360, Guide to Fruit Production. Note, only Envidor and Nexter are registered for apple rust mite.